

# **Modelling of manure production by pigs. Effect of feeding, storage and treatment on manure characteristics and emissions of ammonia and greenhouse gases**

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A model was developed from literature data to predict ammonia and greenhouse gases emissions (CH<sub>4</sub>, N<sub>2</sub>O), and the characteristics of the effluent (volume, dry and organic matter, N, K, P, Cu and Zn) produced by pigs in contrasted situations of manure collection, storage and treatment. The model was constructed in three parts. Part (1) predicts nutrient excretion according to animal performance and feeding strategy. Part (2) predicts changes in manure composition and air emissions according to storage practices (liquid or solid) and climatic conditions. Part (3) predicts the evolution of manure during biological treatment, anaerobic digestion or composting. Original equations as well as published relationships were used to build the model. Part (1) was validated using 19 experimental studies, whereas internal and expert validation was performed for part (2) and (3), and the comprehensive model. The effects of different feeding strategies and mitigation techniques during storage were tested, and advantages and weak points could be identified for each alternative of manure management. Such a model can be an efficient tool to quantify and limit harmful emissions, while obtaining manure better adapted to each farming situation. This is illustrated through different examples.